

L Number	Hits	Search Text	DB	Time stamp
2	251	first adj (heat\$3 or resist\$3 or electrothermal or eject\$3 or discharg\$3) with first adj tim\$3	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2003/07/31 13:46
3	270	second adj (heat\$3 or resist\$3 or electrothermal or eject\$3 or discharg\$3) with second adj tim\$3	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2003/07/31 13:51
4	154	(first adj (heat\$3 or resist\$3 or electrothermal or eject\$3 or discharg\$3) with first adj tim\$3) and (second adj (heat\$3 or resist\$3 or electrothermal or eject\$3 or discharg\$3) with second adj tim\$3)	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2003/07/31 13:51
5	6	((first adj (heat\$3 or resist\$3 or electrothermal or eject\$3 or discharg\$3) with first adj tim\$3) and (second adj (heat\$3 or resist\$3 or electrothermal or eject\$3 or discharg\$3) with second adj tim\$3)) and 347/\$.ccls.	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2003/07/31 14:09
6	22	driv\$3 with sequential\$2 with (first or primary) adj (heat\$3 or resist\$3 or electrothermal)	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2003/07/31 14:12
7	15	driv\$3 with sequential\$2 with (second or secondary) adj (heat\$3 or resist\$3 or electrothermal)	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2003/07/31 14:12
8	8	(driv\$3 with sequential\$2 with (first or primary) adj (heat\$3 or resist\$3 or electrothermal)) and (driv\$3 with sequential\$2 with (second or secondary) adj (heat\$3 or resist\$3 or electrothermal))	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2003/07/31 14:12

US-PAT-NO: 5886716

DOCUMENT-IDENTIFIER: US 5886716 A

TITLE: Method and apparatus for  
variation of ink droplet  
velocity and droplet mass in  
thermal ink-jet print heads

DATE-ISSUED: March 23, 1999

INVENTOR-INFORMATION:

NAME	STATE	ZIP CODE	CITY	COUNTRY
Heinzl; Joachim			Munchen	
	N/A	N/A		DE
Hochwind; Bernhard			Munchen	
	N/A	N/A		DE
Zollner; Alfred			Eitting	
	N/A	N/A		DE

US-CL-CURRENT: 347/48, 347/57 , 347/62 , 347/94

ABSTRACT:

Variation of ink droplet velocity and droplet mass in thermal ink-jet print heads having at least (one primary heater element) is achieved by means of a circuit for generating time-shifted heating pulses.

The heater element structure is such that there is at least (one secondary heater element) in addition to and physically separated from each primary heater element. The circuit for generating time-shifted heating pulses for the primary and secondary heater elements applies those pulses in

such a way that a vapor  
bubble ~~has already~~ formed in the printing fluid on  
the secondary heater element  
at the point at which a vapor bubble starts to form  
in the printing fluid on  
the primary heater element.

5 Claims, 11 Drawing figures

Exemplary Claim Number: 1

Number of Drawing Sheets: 5

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Claims Text - CLTX (18):

(i) providing a first heating energy pulse to  
said primary heater element  
during a first time period;

Claims Text - CLTX (19):

(ii) providing a second heating energy pulse to  
said damper bubble heater  
elements during a second time period commencing a  
predetermined time prior to  
the beginning of said first period to control drop  
ejection velocity; and

Current US Original Classification - CCOR (1):

347/48

Current US Cross Reference Classification - CCXR

(1):

347/57

Current US Cross Reference Classification - CCXR  
(2):  
347/62

Current US Cross Reference Classification - CCXR  
(3):  
347/94